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ABSTRACT

Factors associated with an unusually high rate of failure on the July 1991 National Council Licensure Examination for Registered Nurses (NCLEX-RN) were analyzed for nursing students at Angelo State University in San Angelo (Texas). Of the 111 nursing degree recipients who took the examination for the first time in July 1991, 18 (16.2%) failed. These 18 candidates were compared with 18 who were randomly selected from among those who passed. The results show that those who performed above average in the biological sciences tended to pass the NCLEX-RN on their first attempt. In addition, performance on the Mosby Assess Test (MAT) (a NCLEX-RN practice examination) had a statistically significant direct effect on NCLEX-RN performance. Based on a prediction model, the MAT alone was able to classify students accurately as passing or failing the NCLEX-RN 83.3% of the time. Key background variables (i.e., race, age, American College Testing Program score, and admission status) were able to accurately predict success or failure on the NCLEX-RN 86.1% of the time. Predictive formulas are described and offered as ways to use the assessment findings from this report. Students who are better prepared academically on admission and who continue to perform above average tend to pass the NCLEX-RN whether or not they take the nursing review course, have different instructors or laboratory times, or are male or female. Implications for improvement of nursing education are discussed. Four tables and two figures present study data. (Author/SLD)

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Angelo State University

Report on the July 1991 National Council Licensure Examination for Registered Nurses (NCLEX-RN)

by
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and
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Office of Institutional Planning, Research and Assessment

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NCLEX-RN Report 1991

Executive Summary

In July 1991, 111 ASN degree recipients took the NCLEX-RN for their first time. A total of 18 or 16.2 percent failed. These 18 candidates were compared with 18 others who were randomly selected from among those who passed. Results indicated that those who performed above average in the biological sciences tended to pass the NCLEX on their first attempt. In addition, performance on the Mosby Assess Test (a NCLEX practice exam) had a statistically significant direct effect on NCLEX performance. Based on a prediction model, the Mosby alone was able to accurately classify students as passing or failing the NCLEX 83.3 percent of the time. Key background variables (i.e., race, age, ACT score and Admission Status) were able to accurately predict success or failure on the NCLEX 86.1 percent of the time. Predictive formulas are described and offered as ways to use the assessment findings from this report. Factors not demonstrating any effect on NCLEX status included: sex, transfer status, LVN status, lab instructor, lab time, and the Nursing Review Course. A complete description of all data may be found in the Office of Institutional Planning, Research and Assessment.

Angelo State University
NCLEX-RN Report 1991

This report is an explanatory analysis of factors associated with the unusually high failure rate on the July 1991 NCLEX examination. It was initiated at the request of the Vice President of Academic Affairs. The Nursing Department was most helpful in assisting with data collection.

A total of 18 or 16.2 percent failed out of 111 first-time candidates taking the test. Figure 1 shows that this first-time rate is the second lowest in six years. All candidates graduated with an Associate in Nursing degree in May of 1991. Results of this study could help educational planners (a) identify factors associated with NCLEX failure and (b) focus the improvement of nursing education.

Method

Design and Sample

Data were collected during the fall of 1991. In November 1991, 18 first-time candidates out of 93 who passed the NCLEX were randomly selected. This "pass-group" was compared to the "fail-group." Tests are planned to determine how representative the random sample is of the population of those who passed the NCLEX.

Variables

This study included 13 variables that were considered by the VPAA, Chair of the Nursing Department and myself to be keys to success on the NCLEX. Variables included sex, race, age, ACT score, admit status (1= first-time, 2=readmit, 3=LVN), Transfer status (1=no transfer, 2=transfer), Core-GPA (mean of grades in anatomy, physiology, microbiology, and chemistry), Nursing 2932 grades, Mosby's Assess Test (a practice exam for RN licensure), lab instructor (i.e., internship supervisor), time of lab (1=day, 2=night), Nursing Review Course (0=no, 1=yes), and NCLEX Group (1=pass, 2=fail).

Statistical Analysis

Basic t-tests and chi-square analyses were carried out with the SAS program to determine group differences. Results below $p<.05$ were considered statistically significant differences.

Path analysis was the major statistical procedure used. Path models are based on multiple regression and are valid tools useful enough as simple descriptive devices to trace paths or can be used to explore casual relationships. In this study a reduced path model resulted from obtaining only significant standardized path coefficients (beta weights). The path analysis was employed in two phases. Phase I consisted of determining the significance of all direct and

indirect casual effects. Through a software application called "Project Gemini," the significance of indirect effects were tested. Phase II consisted of a second round of regressions, eliminating nonsignificant paths from the first series of regressions. These analyses yielded a "reduced" path model. Data were analyzed with the SAS program using $p<.05$ as the criterion for retaining a path.

Results

Table 1 displays all of the factors evaluated in the study. As shown, only GPA and the Mosby Assess Test demonstrated statistically significant differences between groups. It should be noted however that core courses with grades of C or D were more prominent among the fail group. Perhaps because of the small sample size, statistical differences were masked.

Table 1

Factors	Pass (N=18)	Fail (N=18)
SEX (F=Female)	F=16	F=17
AGE	35.4	32.8
RACE (W=White)	W=15	W=9
HOW ADMIT (T=Transfer)	T=10	T=7
ASN ADMIT (LVN OR READM)	5	8
GPA**	2.77	2.40
Core GPA**	2.9	2.38
ACT	16.7	15.8
N2932 (C=Course Grade)	C=10	C=16
MOSBY**	66.5%	57%
LAB INSTRUCTOR	–	–
LAB TIME (a.m. or p.m.)	PM=4	PM=7
NURSE REVIEW COURSE	12	11
CORE COURSES (C or D)		
ANATOMY	5	9
ANATOMY TRANSFERS	1	3
TOTAL	6	12
PHYSIOLOGY	9	14
PHYSIOLOGY TRANSFERS	2	3
TOTAL	11	17
CHEMISTRY	0	2
CHEMISTRY TRANSFERS	2	3
TOTAL	2	5
CHEMISTRY LAB	3	5
CHEMISTRY LAB TRANSFERS	0	2
TOTAL	3	7
MICROBIOLOGY	4	7
MICROBIOLOGY TRANSFER	2	4
TOTAL	6	11

** $p<.01$

Table 2 shows an analysis by total core courses taken. Among transfers, 68 percent of the Cs were made by those in the fail group. Among non-transfers, 62 percent of the Cs and 69 percent of the Ds came from the fail group. When all students were combined, nearly two-thirds (64.9%) of all the Cs and Ds came from the fail group.

Table 3 gives a specific break out of transfer student performance. Again, those in the fail group transferred lower grades to ASU. In an analysis of school attended, no significant differences were found.

Table 4 displays the means, standard deviations and intercorrelations among variables in the model. Since the lab instructor variable was nominal level and failed to demonstrate any statistical difference it was omitted from the table. All subsequent path analyses were based on these descriptive statistics and the correlation matrix. As Table 4 shows, a group mean of 1.5 indicates that there were as many in the pass group (i.e., 18) as in the fail group (i.e., 18). Note also that items with asterisks indicate significant correlations.

Table 2

Core Composite (5 courses across 36 students) by Transfer and Pass/Fail Status

Transfer Students**

Grades	Pass	Fail
A	2	2
B	12	2
C	6	13
D	0	0

**χ^2_2 = 9.54, p=.008

Non-Transfer Students**

Grades	Pass	Fail
A	24	13
B	18	18
C	17	28
D	4	9

**χ^2_3 = 7.7, p= .005

Core Composite by Pass/Fail Only

Grades	Pass**	Fail
A	26	15
B	30	20
C	23	41
D	4	9

**χ^2_3 = 11.91 p= .007

Figure 2 shows the reduced path model. In examining the left to right casual flow, the reduced model explained 46 percent of the variance in NCLEX performance. From the model, one's NCLEX success or failure was directly affected only by the Mosby test; however, race had significant indirect effects on NCLEX success. Race was mediated primarily by the Mosby Test. This simply indicates that those most likely to do well on the Mosby and pass the NCLEX on their first attempt were white.

Background characteristics played a significant indirect role in predicting NCLEX success. While gender was not found to be a factor, race, age and ACT score were. As to race, those most successful were white. As to age, older nursing students out performed younger ones on the Mosby. And, as expected, those with higher ACT scores did better in the core courses.

In terms of the usefulness of these assessment findings, discriminant analysis was used to predict NCLEX success. Using only the Mosby results as a predictor, the model correctly classified 17 of 18 in the pass group for a 94.4 percent hit rate. In the fail group, 13 of 18 were correctly classified for a 72.2 percent hit rate. Overall, using only the Mosby, 83.3 percent were correctly predicted. The following is a formula that can be used to accurately predict success rate on the NCLEX 83.3 percent of the time just based on Mosby results:

NCLEX = 4.3558 - 4.6247 (Mosby)
Predicted Success
(Pass=1; Fail=2)

For example, if a student scored .50 on the Mosby, he/she would have a predicted NCLEX grouping of 2.044. Since this is closer to 2 than 1, he/she would be predicted to fail NCLEX.

Another application is in the admissions and advising area. If only background variables are considered (i.e., race, age, ACT and Admit Status), then discriminant analysis accurately predicted all of the pass group and 13 of 18 (or 72.2%) in the fail group. Overall, using these

four background predictors, the model successful classified 86.1 percent of all students as either passing or failing the NCLEX. The formula looks as follows:

NCLEX= 1.22+ .347 (race) - .008 (age) -.0145 (ACT) + .24 (Admit)
Predicted Success
(Pass=1; Fail=2)

For example, if a student was white (race=1), 43 years old, had an ACT of 18, was regularly admitted (Adm=1), then he/she would have a predicted NCLEX grouping of 1.202. Since this is closer to 1 than 2, he/she would be predicted to pass the NCLEX.

Discussion and Recommendations

The results of this investigation are generally intuitive in nature. Students better prepared academically upon arrival and who continue to perform above average, tend to pass the NCLEX. This is true regardless of whether or not they take the Nursing Review Course (NRC), are male or female, have different lab instructors or lab times.

Regarding the NRC a few comments are in order. These are based on my November 14 personal interview with Dr. Larry Eustace, President of Texas Continuing Education services for Nurses. He oversees the Nursing Review Course. A total of 78 of 111 (or 70.3%) ASU graduates attended the NRC. Among the 33 who did not attend, 21 percent failed the NCLEX. Surprisingly, 14 percent of those who ***did*** attend failed it also. While this percent is lower it is not statistically significant (χ^2_1=.42, p=.52).

Dr. Eustace indicates that 85 percent (actually, 85.9%) of those who attended the NRC were successful on the NCLEX. However, 79 percent who did ***not*** attend were also successful. This difference margin is not statistically significant. He suggested that timing of the NRC is a major problem. It is given one week prior to the board exam. This year it was given July 1-5. The NCLEX was administered July 9-10, giving students only about four days to react to deficiencies. He also mentioned that the site location was moved from ASU to the Holiday Inn during the week of the NRC. This was done because of an air conditioning problem at ASU.

Recommendations

Based on that conversation and the results of this analysis, the following recommendations are offered:

1. Move the Nursing Review Course (NRC) back at least two weeks prior to boards.

2. Explain to students that the NRC is no panacea.

Table 3

Transfers: Core Courses & Grades

Fail Group Student ID#	School Attended	Class Taken	Grade Rcvd
7343	Cisco Jr. College	Microbiology	A
8784	Cisco Jr. College	Physiology	C
	Cisco Jr. College	Microbiology	C
	Howard Payne Univ	Anatomy	C
	Howard Payne Univ	Chemistry	C
3631	Southwest Tx Jr. College	Anatomy	A
	Howard College-Big Sp	Physiology	B
	Howard College-Big Sp	Microbiology	B
4840	McMurry	Anatomy	C
	McMurry	Physiology	C
	Cisco Jr. College	Microbiology	C
	McMurry	Chemistry	C
0068	Austin Comm College	Microbiology	C
6756	Cisco Jr. College	Anatomy	C
	Cisco Jr. College	Physiology	C
	Cisco Jr. College	Microbiology	C
	McMurry	Chemistry	C

Pass Group Student ID#	School Attended	Class Taken	Grade Rcvd
8533	Cisco Jr. College	Microbiology	B
	Cisco Jr. College	Chemistry	B
3920	Howard College-Big Sp	Microbiology	B
7299	Sul Ross State Univ	Anatomy	A
	Sul Ross State Univ	Physiology	C
	Sul Ross State Univ	Microbiology	B
	Sul Ross State Univ	Chemistry	B
4013	Cisco Jr. College	Anatomy	A
	Cisco Jr. College	Physiology	B
	Cisco Jr. College	Microbiology	C
	Cisco Jr. College	Chemistry	C
0556	Cisco Jr. College	Microbiology	B
0940	Cisco Jr. College	Anatomy	B
	Cisco Jr. College	Physiology	B
	Cisco Jr. College	Microbiology	B
	Cisco Jr. College	Chemistry	C
7073	Texas Tech Univ	Anatomy	C
4247	Cisco Jr. College	Anatomy	B
	Cisco Jr. College	Physiology	C
	Cisco Jr. College	Microbiology	B

3. Advise students that performance on the Mosby Assess Test as well as above average grades in the biological sciences (i.e., core courses) are their best bets in terms of passing the NCLEX.

4. For transfer students, with grades less than B in core biological science, strongly recommend that they re-take the course or at least remediate prior to taking the NCLEX.

5. Use these assessment findings to screen applicants upon admission or to advise them upon entry into the ASN program. The formula, NCLEX Prediction=1.22 + .347 (race) - .008 (age) - .0145 (ACT) + .24 (Admit), was found to accurately predict NCLEX success or failure 86.1 percent of the time.

Limitations

This study has two major weaknesses. The generalizability of the study is limited by the fact that it is not longitudinal. That is, it is a one-shot assessment. Trends over time might yield results with greater validity. Another limitation is that of sample size. Groups of less than 30 often contain statistical aberrations.

Table 4

Means, Standard Deviations, and Intercorrelations Among Variables

Variables	Means	Standard Deviations	Correlations											
			1	2	3	4	5	6	7	8	9	10	11	12
1 Sex	1.92	.28	1.0											
2 Race	1.33	.48	.21	1.0										
3 Age	34.11	10.46	.01	-.05	1.0									
4 ACT	16.27	3.58	-.14	-.26	-.13	1.0								
5 Admit	1.58	.84	.21	-.07	.32	.08	1.0							
6 TRN	1.39	.49	.03	-.08	.38*	-.27	.13	1.0						
7 GPA	2.64	.60	-.30	-.43**	.05	.39*	-.20	.05	1.0					
8 N2932	2.31	.52	-.02	-.42*	-.04	.25	.04	.08	.52**	1.0				
9 Mosby	.62	.07	-.23	-.49**	.29	.26	-.01	.20	.56***	.57	1.0			
10 Time	1.31	.47	-.02	-.21	-.35*	.02	-.03	-.16	-.03	.07	-.17	1.0		
11 NRC	.64	.49	.19	-.08	-.27	-.06	.04	-.11	-.18	.11	-.03	-.01	1.0	
12 Group	1.5	.51	.10	.35*	-.13	-.13	.03	-.11	-.44**	-.38*	-.66***	.18	-.06	1.0

* <.05
** <.01
*** <.001

ASU NCLEX-RN FIRST TIME PASS RATE JULY 1986-91

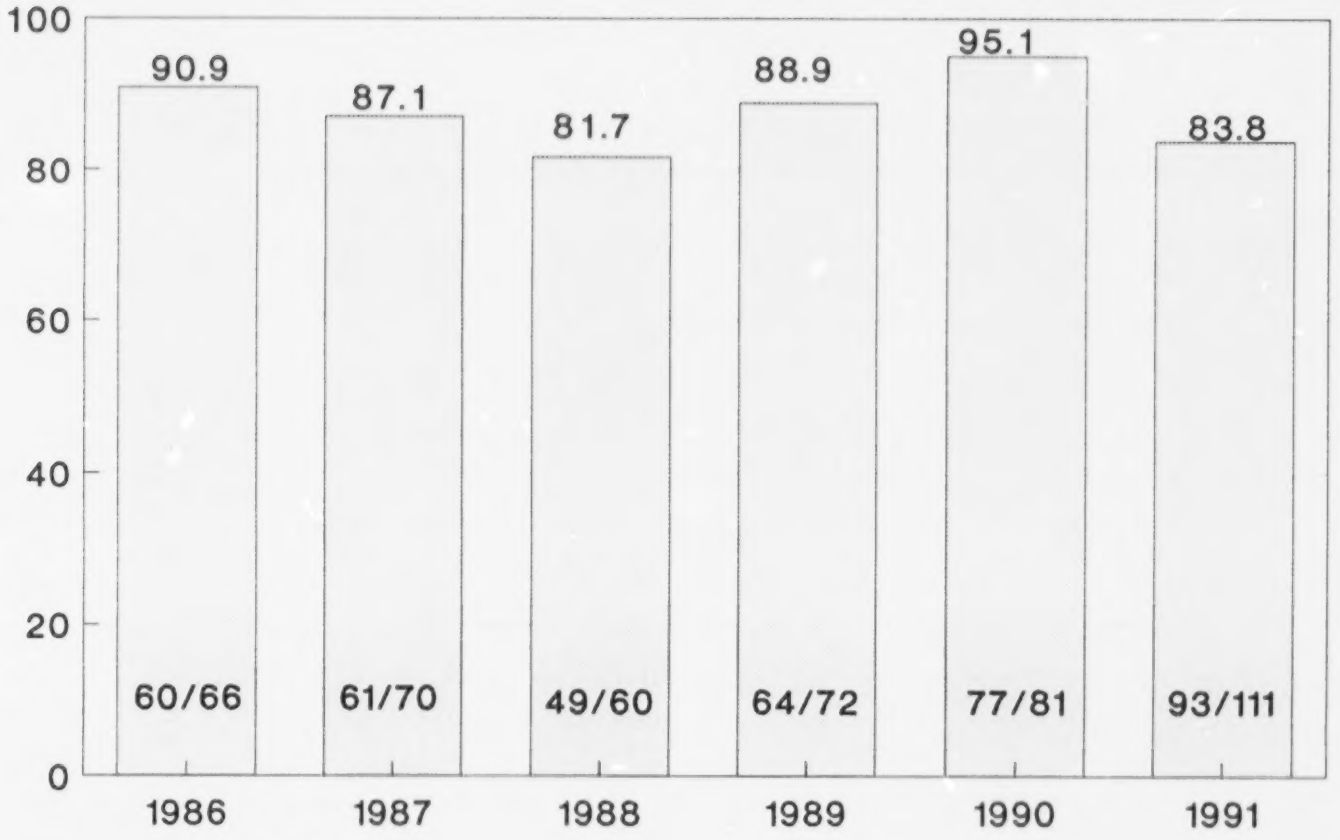
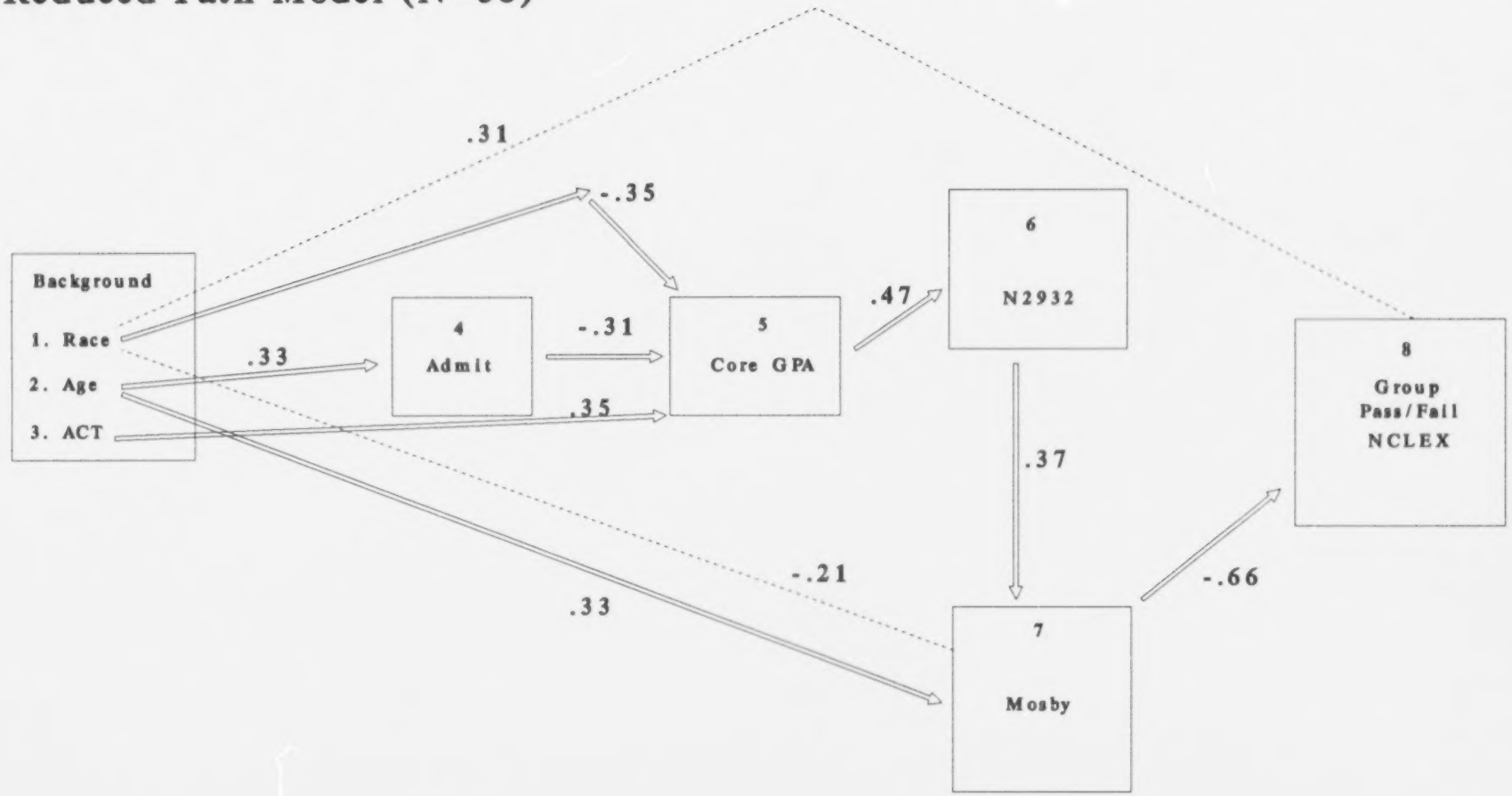


Figure 1

Figure 2
Reduced Path Model (N=36)



Notes:

R^2 = .46 *(This indicates that 46% of the flucuation in NCLEX scores can be accounted for by the seven variables in this model.)*

= Direct Effect

= Indirect Effect

Significant Paths (These depict paths that were found to be statistically related to variables in the model. Decimal numbers are similar to correlations. Those approaching + 1 indicate the strongest relationships.)